IN THE CLAIMS:

1.   (currently amended) A method for adaptively generating perceptually uniform printer characterization samples in a three-dimensional (3-D) signal space, the method comprising:

generating a first plurality lines, each including a second plurality of samples, in a printer 3-D signal space;

in response to the line samples, printing signal space color targets;

measuring the signal space color targets;

from the signal space color targets, generating a first plurality of lines, each line including a plurality of perceptually uniform samples;

generating polygon shapes in the 3-D signal space from the perceptually uniform sampled lines;

calculating additional perceptually uniform sample points associated with each polygon; and,

generating a final target in the printer 3-D signal space using the calculated perceptually uniform sample points.

2.   (original)   The method of claim 1 wherein generating a first plurality lines in a printer 3-D signal space includes generating 19 lines.

3.   (original)   The method of claim 1 wherein generating a first plurality of lines in a printer 3-D signal space includes generating lines between vertices selected from the group including black

(O), white (W), blue (B), cyan (C), green (G), magenta (M), red (R), and yellow (Y) vertices in RGB and CMY color space.

4.   (original)   The method of claim 1 wherein generating a first plurality lines, each including a second plurality of samples, in a printer 3-D signal space includes generating a second plurality of samples uniformly separated in the 3-D signal space.

5.   (original)   The method of claim 4 wherein generating a first plurality of lines, each including a plurality of perceptually uniform samples includes:

for each line, generating a metric distance function having an input axis to accept signal space samples and an output axis;

in response to the metric distance function, creating a third plurality of perceptually uniform samples on the output axis; and,

using the inverse of the metric distance function, mapping the third plurality of perceptually uniform samples onto the line.

6.   (original)   The method of claim 5 wherein forming a first plurality of lines differentiated into a third plurality of perceptually uniform samples includes generating 1 black-white (OW) line with samples differentiated by brightness (L).

7.   (original)   The method of claim 5 wherein forming a first plurality of lines differentiated into a third plurality of perceptually uniform samples includes generating 6 primary-to-secondary lines with

samples differentiated by a red-green channel (a) and a yellow-blue channel (b).

8.   (original)   The method of claim 5 wherein forming a first plurality of lines differentiated into a third plurality of perceptually uniform samples includes generating 6 lines with a black (O) vertex and 6 lines with a white (W) vertex, each of the 12 lines having samples differentiated by L, a, b.

9.   (original)   The method of claim 3 wherein generating polygon shapes in 3-D signal space from the perceptually uniform sampled lines includes partitioning a cube representation of 3-D signal space into 6 tetrahedra bounded by the 19 perceptually uniform sampled lines.

10.   (original)   The method of claim 9 wherein partitioning a cube representation of 3-D signal space into 6 tetrahedra bounded by the 19 perceptually uniform sampled lines includes forming each tetrahedron with a black (O) vertex, a white (W) vertex, a primary vertex (P) selected from the group including red (R), green (G), and blue (B), and a secondary vertex (S) selected from the group including cyan (C), magenta (M), and yellow (Y).

11.   (original)   The method of claim 10 wherein generating a first plurality of lines, each including a plurality of perceptually uniform samples includes generating n samples per line; and,

wherein calculating addition perceptually uniform sample points associated with each polygon includes generating N samples per tetrahedron as follows:

$$N = n((n + 1)(2n + 1)/ 12) + n(n + 1)/4;$$

inclusive of the n samples per line segment.

12.   (currently amended)   The method of claim 11 wherein calculating additional perceptually uniform sample points associated with each polygon includes:

generating $(n + 1)/2$ successively smaller layers for each tetrahedron; and,

calculating the location of additional perceptually uniform samples on each of the layers.

13.   (original)   The method of claim 12 wherein generating a final target in the printer 3-D signal space using the calculated perceptually uniform sample points includes calculating n^3 sample points.

14.   (original)   The method of claim 12 wherein calculating the location of additional perceptually uniform samples on each of the layers includes:

defining each layer as having two adjoining triangular faces;

finding a common edge of the two triangular faces connecting a first vertex (P_i) on the OPW face to a second vertex (S_i) on the OSW face of the tetrahedron; and,

defining a third and a fourth vertices, both on the OW line.

15. (original) The method of claim 14 wherein defining a third and a fourth vertices includes, for an inner layer (i > 1), defining the third vertex being the i-th sample (OW_i) of the on the OW line, with respect to black (O), and the fourth vertex being the i-th sample ($OW_{(n-i+1)}$) on the OW line, with respect to white (W); and,

wherein finding a common edge of the two triangular faces connecting a first vertex (P_i) on the OPW face to a second vertex (S_i) on the OSW face of the tetrahedron includes:

obtaining P_i by the intersection between the line connecting the i-th sample from W on the WO line and the i-th sample from P on the OP line; and,

obtaining S_i by the intersection between the line connecting the i-th sample from W on the WO line and the i-th sample from S on the OS line.

16. (original) The method of claim 15 wherein calculating the location of additional perceptually uniform samples on each of the layers includes:

calculating perceptually uniformly distributed samples on each edge of the triangular faces; and,

calculating perceptually uniformly distributed samples on the interior of the two triangle faces from the samples on the edges.

17.   (original)   The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes, for the outer most layer ($i = 1$), using sample points on the perceptually uniform sampled lines to define the edges of the tetrahedron triangular faces.

18.   (original)   The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes, for an inner layer ($i > 1$), perceptually uniformly distributed samples on OW_i-P_i being obtained by the following procedure:

for each sample of the on the OW line between OW_i and $OW_{(n-i+1)}$, finding a corresponding sample on the OP line by the following rule:

finding a k-th sample from O on the OW line corresponding to a k-th sample from O on the OP line; and,

calculating the intersections of line OW_i-P_i and the lines connecting the corresponding samples on OW and OP lines to obtain perceptually uniform sample points on OW_i-P_i.

19.   (original)   The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes, for an inner layer ($i > 1$), perceptually uniformly distributed samples on $OW_{(n-i+1)}$-P_i being obtained by the following procedure:

for each sample on the OW line between OW_i and $OW_{(n-i+1)}$, finding its corresponding sample of the PW line by the following rule:

finding a k-th sample from O on the OW line corresponding to a k-th sample from P on the PW line; and,

calculating the intersections of line $OW_{(n-i+1)}$-P_i and the lines connecting the corresponding samples on OW and PW lines to obtain perceptually uniform sample points on OW_i-P_i.

20. (original) The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes, for an inner layer (i > 1), perceptually uniformly distributed samples on OW_i-S_i being obtained by the following procedure:

for each sample on the OW line between OW_i and $OW_{(n-i+1)}$, finding its corresponding sample on the OS line by the following rule:

finding a k-th sample from O on the OW line corresponding to a k-th sample from O on the OS line; and,

calculating the intersections of line OW_i-S_i and the lines connecting the corresponding samples on OW and OS lines to obtain perceptually uniform sample points on OW_i-S_i.

21. (original) The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes, for an inner layer (i > 1), perceptually uniformly distributed samples on $OW_{(n-i+1)}$-Si being obtained by the following procedure:

for each sample on the OW line between OW_i and $OW_{(n-i+1)}$, finding its corresponding sample on the SW line by the following rule:

finding a k-th sample from O on the OW line corresponding to a k-th sample from S on the SW line; and,

calculating the intersections of line $OW_{(n-i+1)}$-S_i and the lines connecting the corresponding samples on OW and SW lines to obtain perceptually uniform sample points on OW_i-S_i.

22. (original) The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes, for an inner layer (i > 1), perceptually uniformly distributed samples on P_i-S_i being obtained by the following procedure:

plotting samples on line PS in the signal space on a horizontal axis of a two-dimensional coordinate system, with point P on the origin;

constructing a straight line passing through the origin and having a slope equal to the ratio between the length of line segment S_i-P_i and that of line segment $PS_{(n-i+1)}$-PS_i;

using the straight line as a transfer function, mapping point PSi on the horizontal axis to P_i on the vertical axis, point $PS_{(n-i+1)}$ on the horizontal axis to S_i on the vertical axis, and every sample on the horizontal axis between PS_i and $PS_{(n-i+1)}$ on line PS to a point between P_i and S_i on the vertical axis; and,

forming perceptually uniform mapped sample points on the vertical axis line segment P_i-S_i.

23. (original) The method of claim 16 wherein calculating the location of additional perceptually uniform samples on each of the layers includes finding additional perceptually uniform sample points on the interior of each of the two adjoining triangular faces as follows:

connecting each sample point vertex on a common, first triangular face edge P_i-S_i to sample points on a second edge S_i-OW and a third edge P_i-OW according to the following rule:

finding a k-th sample from P_i on the P_i-S_i first edge corresponding to a k-th sample from P_i on the P_i-OW third edge, and a k-th sample from Si on P_i-S_i corresponding to a k-sample from S_i on the S_i-OW second edge;

connecting corresponding sample points on the P_i-S_i first edge and the P_i-OW third edge, forming a first group of lines;

connecting corresponding sample points on the P_i-S_i first edge and the S_i-OW second edge, forming a second group of lines; and,

making internal interconnection points between the first and second groups of lines perceptually uniform sample points within the triangular faces.

24. (original) The method of claim 23 wherein finding additional perceptually uniform sample points on the interior of each of the two adjoining triangular faces includes a first triangular face having the vertices of P_i, S_i, and $OW_{(n-i+1)}$.

25. (original) The method of claim 23 wherein finding additional perceptually uniform sample points on the interior of each of

the two adjoining triangular faces includes a second triangular face having the vertices of P_i, S_i, and OW_i.

26.   (original)   The method of claim 14 wherein for the outer most layer ($i = 1$), defining each layer as having two adjoining triangular faces includes finding the two triangular faces as being faces OPS and WPS of the tetrahedron.